

U.S. Patent Application Serial No. 09/591,508
Office Action dated July 27, 2004
Response dated November 16, 2004

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Canceled)

Claim 2 (Currently Amended): A method of grinding a magnetic member, comprising:

a first step of grinding a magnetic member by grinding means having an edge including heat resistant resin and super hard abrasive grain while supplying grinding fluid to a grinding region;

a second step of magnetically separating sludge from the grinding fluid drained from the grinding region by using magnetic separation means; and

a third step of introducing the grinding fluid which has undergone the second step into a tank provided therein with a plurality of barrier plates of different sizes capable of turning a flow of the grinding fluid by generally a right angle in a horizontal plane and providing the grinding fluid with a flowing path which changes directions in a horizontal plane at least two times, and separating the sludge from the grinding fluid by magnetic coagulation and subsequent sedimentation of the sludge in the tank,

wherein the magnetic separation means includes a magnet roller having a plurality of magnets disposed in longitudinal lines and circumferential rows.

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polarity of the magnets being alternated in each of the longitudinal lines of the magnets, and
in each of the circumferential rows of the magnets.

Claim 3 (Previously Presented): The method according to Claim 2, wherein
the magnetic member includes a rare-earth alloy,
the second step using magnetic separation means having a surface magnetic flux density not
smaller than 0.25 T for separation of the sludge.

Claim 4 (Previously Presented): The method according to Claim 2, wherein the grinding fluid
is primarily made of water.

Claim 5 (Previously Presented): The method according to Claim 2, wherein the grinding fluid
after separation of the sludge is supplied to the grinding region for use in circulation.

Claim 6 (Canceled)

Claim 7 (Currently Amended): A method for treating waste fluid, comprising:
a first step of separating sludge containing a rare-earth alloy from waste fluid by using
magnetic separation means having a surface magnetic flux density not smaller than 0.25 T; and
a second step of introducing the waste fluid which has undergone the first step into a tank

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provided therein with a plurality of barrier plates of different sizes capable of turning a flow of the waste fluid by generally a right angle in a horizontal plane and providing the waste fluid with a flowing path which changes directions in a horizontal plane at least two times, and separating the sludge from the waste fluid by magnetic coagulation and subsequent sedimentation of the sludge in the tank,

wherein the magnetic separation means includes a magnet roller having a plurality of magnets disposed in longitudinal lines and circumferential rows,

polarity of the magnets being alternated in each of the longitudinal lines of the magnets, and in each of the circumferential rows of the magnets.

Claim 8 (Canceled)

Claim 9 (Currently Amended): An apparatus for grinding a magnetic member, comprising:
grinding operation means for grinding a magnetic member by using grinding means having an edge including heat resistant resin and super hard abrasive grain while supplying grinding fluid to a grinding region;

magnetic separation means for separating sludge from the grinding fluid drained from the grinding region; and

a tank disposed on a downstream side of the magnetic separation means, for reception of the grinding fluid and sedimentation of magnetically coagulated sludge; and

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a plurality of barrier plates of different sizes in the tank, capable of turning a flow of the grinding fluid by generally a right angle in a horizontal plane and providing the grinding fluid with a flowing path which changes directions in a horizontal plane at least two times,

wherein the magnetic separation means includes a magnet roller having a plurality of magnets disposed in longitudinal lines and circumferential rows,

polarity of the magnets being alternated in each of the longitudinal lines of the magnets, and in each of the circumferential rows of the magnets.

Claim 10 (Previously Presented): The apparatus according to Claim 9, wherein the magnetic member includes a rare-earth alloy, the magnetic separation means having a surface magnetic flux density not smaller than 0.25 T.

Claim 11 (Previously Presented): The apparatus according to Claim 9, wherein the grinding fluid is primarily made of water.

Claim 12 (Previously Presented): The apparatus according to Claim 9, further comprising circulating means for supplying the grinding fluid after separation of the sludge to the grinding region for use in circulation.

Claim 13 (Canceled)

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Claim 14 (Canceled)

Claim 15 (Currently Amended): A rare-earth magnet obtained by using a grinding method:
the method comprising;

a first step of grinding a magnetic member by grinding means having an edge including heat resistant resin and super hard abrasive grain while supplying grinding fluid to a grinding region,

a second step of magnetically separating sludge from the grinding fluid drained from the grinding region by using magnetic separation means, and

a third step of introducing the grinding fluid which has undergone the second step into a tank provided therein with a plurality of barrier plates of different sizes capable of turning a flow of the grinding fluid by generally a right angle in a horizontal plane and providing the grinding fluid with a flowing path which changes directions in a horizontal plane at least two times, and separating the sludge from the grinding fluid by magnetic coagulation and subsequent sedimentation of the sludge in the tank to obtain supernatant fluid of the grinding fluid,

wherein the supernatant fluid is supplied to the grinding region for use in circulation,

wherein the magnetic separation means includes a magnet roller having a plurality of magnets disposed in longitudinal lines and circumferential rows,

polarity of the magnets being alternated in each of the longitudinal lines of the magnets, and in each of the circumferential rows of the magnets.

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Claim 16 (Currently Amended): A method for grinding a magnetic member, comprising:

a first step of grinding a Nd-Fe-B rare-earth alloy by grinding means having an edge including heat resistant resin and super hard abrasive grain while supplying grinding fluid to a grinding region;

a second step of magnetically separating fine-particle sludge from the grinding fluid drained from the grinding region by using magnetic separation means; and

a third step of introducing the grinding fluid which has undergone the second step into a tank provided therein with a plurality of barrier plates of different sizes capable of turning a flow of the grinding fluid by generally a right angle in a horizontal plane and providing the grinding fluid with a flowing path which changes directions in a horizontal plane at least two times, and separating the sludge from the grinding fluid by magnetic coagulation and subsequent sedimentation of the sludge in the tank,

wherein the magnetic separation means includes a magnet roller having a plurality of magnets disposed in longitudinal lines and circumferential rows,

polarity of the magnets being alternated in each of the longitudinal lines of the magnets, and in each of the circumferential rows of the magnets.

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Claim 17 (Currently Amended): A method for grinding a magnetic member, comprising:

a first step of grinding a rare-earth alloy which includes a hard primary phase and a tough grain boundary phase by grinding means having an edge including heat resistant resin and super hard abrasive grain while supplying grinding fluid to a grinding region;

a second step of magnetically separating sludge from the grinding fluid drained from the grinding region by using magnetic separation means; and

a third step of introducing the grinding fluid which has undergone the second step into a tank provided therein with a plurality of barrier plates of different sizes capable of turning a flow of the grinding fluid by generally a right angle in a horizontal plane and providing the grinding fluid with a flowing path which changes directions in a horizontal plane at least two times, and separating the sludge from the grinding fluid by magnetic coagulation and subsequent sedimentation of the sludge in the tank,

wherein the magnetic separation means includes a magnet roller having a plurality of magnets disposed in longitudinal lines and circumferential rows,

polarity of the magnets being alternated in each of the longitudinal lines of the magnets, and in each of the circumferential rows of the magnets.